MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2, 2015/2016

DCS5038 – PROGRAM DESIGN

(DIT & DBIS)

2 MARCH 2016
2:30 p.m – 4:30 p.m
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This Question paper consists of **NINE (9)** pages (excluding the cover page). There are **TWO (2)** sections in this paper.

2. **Section A**: There are **FOUR (4)** structured questions. Answer ONLY **THREE (3)** questions in the answer booklet provided.

3. **Section B**: There are **TWO (2)** structured questions. Answer ONLY **ONE (1)** question in the answer booklet provided.

SECTION A (75 Marks)

Instruction: Choose and answer **ONLY THREE (3)** questions from this section and write your answers in the answer booklet provided.

QUESTION 1 (25 Marks)

a. List and explain **THREE (3)** advantages of using C Language. (6 Marks)

b. Table 1 shows the revenue and cost of E&A Company for the past three months.

Table 1

	Jan	Feb	March
Revenue	20000	26000	30000
Cost	15000	20000	35000

i. Design a flowchart to help E&A Company to identify whether it is making profit or loss for each month. (9 Marks)

- Initialize all the required variables.
- Get the inputs of revenue and cost from the user.
- Display the profit/loss status. (hints: use *if-else* to examine if revenue is greater than cost)
- Repeat the process by using ***while*** loop.

OUTPUT SCREEN

```
Enter revenue:20000
Enter cost:15000
Profit

Enter revenue:26000
Enter cost:20000
Profit

Enter revenue:30000
Enter cost:35000
Loss
```

ii. Based on the descriptions in part (i), write the pseudocode. (10 Marks)

Continued.....

QUESTION 2 (25 Marks)

a. Trace and identify the output of the following code segments:

i. (3 Marks)

```
void main()
     {
          int c, a = 3, b = 4;

          c =  a++ + ++b;

          printf("%d %d %d", c, a, b);
     }
```

ii. (3 Marks)

```
void main()
{

       int x;
       for (x=1; x<15;x++)
       {
          printf("%d\n",x);
         x*=3;
       }
}
```

b. The Air Pollution Index (API) is a simple and generalized way to describe the air quality, which is used in Malaysia. Based on the given table, write a program to express air status by using *if-else* statement. (9 Marks)

- Prompt user to enter *index*.
- Identify the *status* with information provided in table 2.
- Display *status*.

Table 2

API	STATUS
0-50	Good
51-100	Moderate
101-200	Unhealthy
201-300	Very Unhealthy
>301	Hazardous

Continued.....

c. Given the codes below, write a function called *cal_mul(...)* to return multiplication result of the 3 input parameters. (4 Marks)

```
int main()
{
      int x=5, y=2, z=4;
      int result;
      result=cal_mul(x,y,z);
      printf("The result is: %d", result);
      return 0;
}
```

d. Identify the syntax error(s) in the following code and correct the error(s).

i. `float a=3.0; b;` (1 Mark)

ii. `char status = g;` (1 Mark)

iii. (2 Marks)
```
/*this program does nothing
int main
{
    return 0;
}
```

iv. (2 Marks)
```
#include(stdio.h)
define PI 3.141592
```

QUESTION 3 (25 Marks)

a. Evaluate whether the following expressions are TRUE or FALSE. Show your workings. *(Note: The expressions are not related to each other.)*

Declaration: `int a = 3, b = 1, c = 2, d = 4;`

i. `a + b == d*1` (2 Marks)

ii. `(d+4) %3 > 3 || a*b + c*d == 11;` (3 Marks)

iii. `! (a/c + b < 2) && c < 1;` (3 Marks)

b. Write *for* nested loops to reproduce the following output: (6 Marks)

OUTPUT SCREEN
1
22
333
4444
55555

Continued.....

c. Write the program based on the instructions from steps (i) to (iii).

i. Declare structure *my_profile*. Data members of the structure are: (4 Marks)
- *name* : string size 40
- *age* : int
- *salary(RM)* : float

ii. Create a structure variable called *Employee* in *main()* function initialized with the following values and pass the structure to a function named *display_profile(...)*. (3 Marks)
- *name* :Amanda Lim Hui Ying
- *age* : 28
- *salary(RM)* : 2500.00

iii. Write a function *display_profile(...)* to display all the values in (ii). (4 Marks)

QUESTION 4 (25 Marks)

a. Write complete codes to store the favorite teams' name entered by user into a file named *myTeam.txt*. If the file could not be created, display "*Error! Could not open the file*". The system keeps prompting the user to enter the favorite teams. The prompt will end if the user enters *-1*. The sample output is shown as below. (11 Marks)

OUTPUT SCREEN

```
Enter your favorite team (-1 to exit):Man Utd
Enter your favorite team (-1 to exit):Liverpool
Enter your favorite team (-1 to exit):Real Madrid
Enter your favorite team (-1 to exit):-1
```

b. Convert the formulas below to proper C expressions. (8 Marks)
(Given $\pi = PI$)

i. $\frac{1}{2}(a+b)(c)$

ii. $\frac{4\pi k}{\left(\frac{1}{a}\right)-\left(\frac{1}{b}\right)}$

iii. $\sqrt{1-\frac{v^2}{c^2}}$

iv. $\frac{xp^5}{M}$

Continued.....

c. Identify the errors and correct them. The sample output is shown as below.
(6 Marks)

```
i.    int a[4][2]={{10,12,14,16};{21,24,26,29}};
ii.   int i,j;
iii.  for (i=0;i<3; i++){
iv.      for (j=0;j<4; j++){
v.       printf("%c ", a[j]);
vi.      }
vii.  printf("\n");
viii. }
```

OUTPUT SCREEN

```
10  12  14  16
21  24  26  29
```

SECTION B (25 Marks)

Instruction: *Choose and answer* ***ONLY ONE (1)*** *question from this section and write your answers in the answer booklet provided.*

QUESTION 1 (25 Marks)

Write a **complete C program** that calculates the amount of payment to be made to a car rental agency based on the selection made by user.

- Declare a structure called *Car*.
  - The structure includes variables such as *name* (string), *model* (string), *choice* (integer), *days* (integer), *option* (integer), *subtotal* (float), *price* (float) and *total* (float).

- In the *main()* function:
  - Create a *Car* structure variable called *rental*.
  - Using a *do-while loop*,
    - Prompt the user to enter the *name, car choice* and *duration* for rental.
    - Call function *get_model(...)* and pass the structure variable array *rental* as parameter. Store the returned value appropriately.
    - Call function *get_price(...)* and pass the structure variable array *rental* as parameter. Store the returned value appropriately.
    - Calculate the *subtotal* using the formula; *price* * *days*.
    - Call function *get_discount(...)* and pass the structure variable array *rental* as parameter. Store the returned value appropriately.
    - Call function *display(...)* and pass the structure variable array *rental* as parameter.
  - Terminate the loop if the user enter -1 (sentinel-controlled).

Continued.....

- In the *get_model(...)* function:
  - Use *switch-case* statement to select the model based on the choice entered by user.

Table 3

Choice	Model
1	*Perodua Myvi SE [Auto]*
2	*Perodua Myvi SE [Manual]*
3	*Perodua Alza SE [Auto]*
4	*Perodua Axia SE [Auto]*

  - Return the car model.

- In the *get_price (...)* function:
  - Use *switch-case* statement to determine the rental price based on the choice entered by user.

Table 4

Choice	Price (RM)
1	*125.00*
2	*100.00*
3	*150.00*
4	*85.00*

  - Return the rental price.

- In the *get_discount (...)* function:
  - Using an *if-else* statement, give a 10% discount if the user rents more than 5 days only.
  - Else, there will be no discount.
  - Return the price after discount.

- In the *display (...)* function:
  - Display the receipt of the transaction.
  - Display the *user's name, car model, rental price, duration of rental, subtotal* and *total price*.

- You are required to write the function prototypes for each function used in the program.

Continued.....

- The output of the program is shown below.

OUTPUT SCREEN

```
-----------------------------------------
-          WELCOME TO MMU CAR RENTAL      -
-----------------------------------------
 1.  PERODUA MYVI SE     [Auto  : RM125/day]
 2.  PERODUA MYVI        [Manual: RM100/day]
 3.  PPERODUA ALZA       [Auto  : RM150/day]
 4.  PERODUA AXIA        [Auto  : RM85/day]
-----------------------------------------
Please enter your name           : Azman
Enter your choice [1 to 4]       : 3
Enter duration for rental (day)  : 4

-----------------------------------------
-          RENTAL RECEIPT                -
-----------------------------------------
Name     : Azman
Model    : Perodua Alza [Auto]
Price    : RM 150.00
Days     : 4
Subtotal : RM 600.00
Total    : RM 600.00 (10% discount if eligible)
-----------------------------------------
Enter -1 to quit, else enter any number to
continue: 9

-----------------------------------------
-          WELCOME TO MMU CAR RENTAL      -
-----------------------------------------
 1.  PERODUA MYVI SE     [Auto  : RM125/day]
 2.  PERODUA MYVI        [Manual: RM100/day]
 3.  PPERODUA ALZA       [Auto  : RM150/day]
 4.  PERODUA AXIA        [Auto  : RM85/day]
-----------------------------------------
Please enter your name           : Mokhtar
Enter your choice [1 to 4]       : 2
Enter duration for rental (day)  : 10

-----------------------------------------
-          RENTAL RECEIPT                -
-----------------------------------------
Name     : Mokhtar
Model    : Perodua Myvi [Manual]
Price    : RM 100.00
Days     : 10
Subtotal : RM 1000.00
Total    : RM 900.00 (10% discount if eligible)
-----------------------------------------
Enter -1 to quit, else enter any number to
continue: -1
```

Continued.....

QUESTION 2 (25 Marks)

Write a **complete C program** based on the following requirements.

- Declare a float constant *GST* using pre-processor directive with value of 0.06.
- In *main()* function:
  - Open a file called *E-Mobile.txt* for writing.
  - If the file can't be opened, display error message *"File cannot be open. Program aborted..."* and quit the program.
  - Declare all necessary variables.
  - Using a ***do-while*** *loop*:
    - Ask user to enter the *phone's model, price* and *promotional code*.
    - Call function *get_subtotal(...)* and pass the *price* and the *promotional code* as parameter. Store the returned value appropriately.
    - Write the *model, price, promotional code* and *subtotal* to the *E-Mobile.txt* file.
    - Display the *model, price, promotional code* and *subtotal*.
    - Calculate the *total price* overall for each item that user has entered inclusive of 6% *GST*.
    - Repeat the steps above as long as user chooses to continue.
  - Call function *get_gift(...)* and pass the *total price* as parameter. Store the returned value appropriately.
  - Call function *display(...)* and pass the *total price* and the *returned value* from function *get_gift(...)*.
  - Close file *E-Mobile.txt*.

- In the *get_subtotal(...)* function:
  - Using *if-else* statement, calculate the *subtotal* to give discount if the user enter the following promotional code:-

Table 5

Code	% discount
MMU16	*10*
SALE5	*5*
else	*0*

  - Return the *subtotal*.

- In the *get_gift(...)* function:
  - Using *if-else* statement, determine the *gift* for the user based on the total spending.

Table 6

Total (RM)	Gift
More or equal to 3,000	*128GB SSD*
More or equal to 1,000	*64GB microSD*
else	*16 GB thumdrive*

  - Return the *gift*.

Continued.....

- In the *display(...)* function:
  - Display *total* spend and the *gift* obtained.
- You are required to write the function prototypes for each function used in the program.
- The output of the program is shown below.

OUTPUT SCREEN

```
************************************************************
=                    Welcome To E-Mobile                   =
************************************************************

Enter the phone's model : Samsung Galaxy Note 5
Enter the price         : RM 2399
Enter promotional code  : MMU16

Brand       : Samsung Galaxy Note 5
Price       : RM 2399.00
Code        : MMU16
Subtotal    : RM 2159.10

Do you want to add another items? [Y/N] : Y

Enter the phone's model : Apple iPhone 6s
Enter the price         : RM 2689
Enter promotional code  : -

Brand       : Apple iPhone 6s
Price       : RM 2689.00
Code        : -
Subtotal    : RM 2689.00

Do you want to add another items? [Y/N] : Y

Enter the phone's model : Google Nexus 6P
Enter the price         : RM 2799
Enter promotional code  : SALE5

Brand       : Google Nexus 6P
Price       : RM 2799.00
Code        : SALE5
Subtotal    : RM 2659.05

Do you want to add another items? [Y/N] : N

The total price for all items inclusive of GST (6%): RM
7957.58
Congratulations! You get a free 128GB SSD from E-Mobile.
```

Content of *E-Mobile.txt* after program terminates

```
Samsung Galaxy Note 5 RM2399.00 MMU16 RM2159.10
Apple iPhone 6s RM2689.00 - RM2689.00
Google Nexus 6P RM2799.00 SALE5 RM2659.05
```

End of page.